



SHADOZ (Southern Hemisphere ADDitional Ozonesondes) Network Report: Activities Update for 2016



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- SHADOZ is a NASA project in collaboration with US and international partners to collect and archive profiles from ozonesondes in tropical environments and remote, value-added locations in the southern hemisphere. Profiles are publicly available at <http://croc.gsfc.nasa.gov/shadoz>.
- Through affiliation with NDACC (Network for Detection of Atmospheric Composition Change; www.ndsc.ncep.noaa.gov) and posting of the profiles through Goddard's AVDC (Aura Validation Data Center) and WMO's WUODC (World Ozone and UV Data Centre), SHADOZ data are distributed to users from the satellite and monitoring communities.
- Using SHADOZ data?? Do not forget to include station PI's and credit JGR papers below. This is a NASA data protocol!
- Since 2012 QOS, SHADOZ has re-activated 5 stations: Ascension Island; Suva, Fiji; Irene, South Africa; San Cristóbal, Ecuador; and Natal, Brazil. [See photos below: "SHADOZ Site Activation"]
- SHADOZ is following the guidelines of WMO and SI2N (SPARC/Intl Ozone Commission/IGACO and NDACC) in the first major reprocessing of ozonesonde data to account for changes over time in ozonesonde instrumentation and techniques among stations (**QOS paper by J. Witte et al, 2016**). [Example lower right: 1st Major reprocessing: Watukosek, Java, Indonesia]

SHADOZ Sites, URL=<http://croc.gsfc.nasa.gov/shadoz>

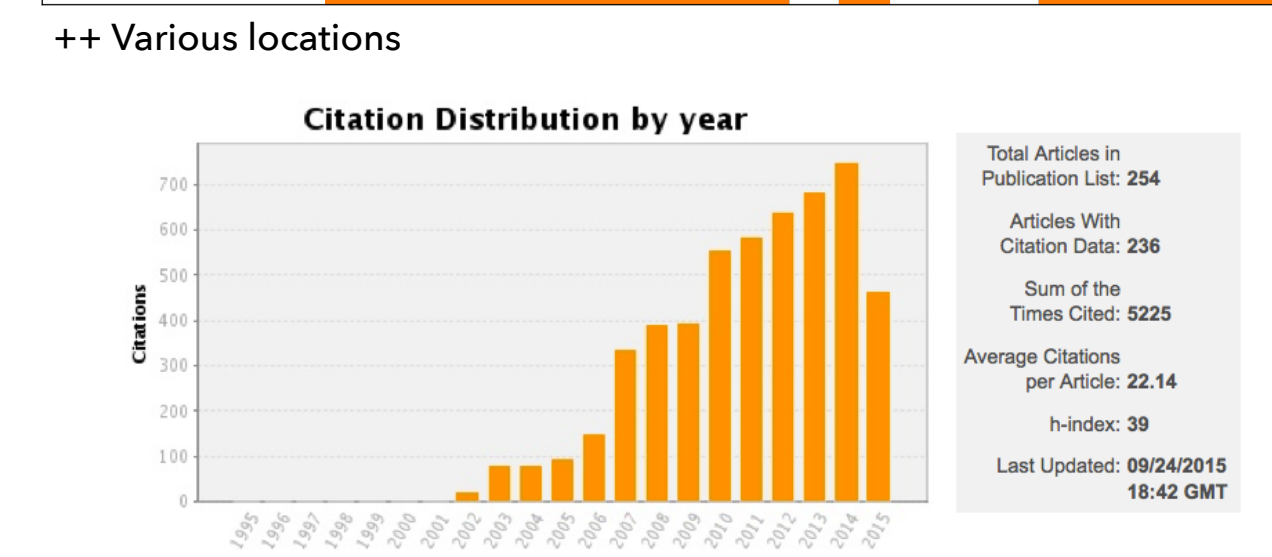


Topic of Study	Station*	Co-I/Sponsor**	SHADOZ start yr	Site start year	Network affiliation **	Ancillary data
Long-term Validation / Trends (Data available prior to 1985)	Kuala Lumpur	Maz. bt Mohamed, & Z Zainul, Malaysian Met., S. Yonemura, Japan	1998	1992		
	Watukosek	Ni. Komala, LAPAN & M. Fujiwara, Hokkaido Univ.	1998	1998	SOWER	CFH (campaign)
	Am. Samoa	B. Johnson, P. Cullis, C. Sterling, NOAA	1998	1986	NDACC / GAW	Dobson / surface CO ₂ , CH ₄ , CO, CFCs, O ₃
	Natal	E. T. Northam, C. Ashburn, P. Bliven, NASA/WFF, F. Rasmussen, INPE	1998	1979	NDACC	Brewer
	Hilo	B. Johnson, D. Hurst, NOAA	1998	1982	NDACC / GAW	MLD, Dobson, FTIR, O ₃ lidar, surface CO ₂ , CH ₄ , CO, CFCs, O ₃ , FPH-WV (12)
Processes in the FT, TTL, and LS	Irene	G.J.R. Coetzee, S. African Weather Serv.	1999	1990		Dobson
	La Reunion	Françoise Posny, Univ. Réunion/CNRS	1998	1998	NDACC	SAOZ, O ₃ Lidar
	Fiji	B. Johnson, NOAA, M. Makite, USP	1998	1997		
	San Jose***	H. B. Sekiri, NASA/GSFC & Holger Vornel	2006	2006	NDACC	Surface O ₃ , SO ₂ , CFH
	San Cristobal	B. Johnson (NOAA), M. Cazorla (USFQ)	1999	1998	GRUAN / SOWER	CFH (campaign)
	Paramaribo	A. Piers, KNMI	1999	1999	NDACC	Brewer
	Ascension Is.	A. M. Thompson, GSFC, w/ USAF	1998	1990	NOAA/GMD	Surface O ₃ CO ₂ , CH ₄ , CO, CFCs
	Nairobi	R. Shuebi, G. Levrat, MeteoSwiss & John Ngonyi, KMD	1999	1996		Dobson, surface O ₃
	Ha Noi	H. Gia Hiep, AMO, S. Ogino, JAMSTEC, M. Fujiwara, Hokkaido U., M. Shiotani, RISH	2005	2004	SOWER	CFH (campaign)

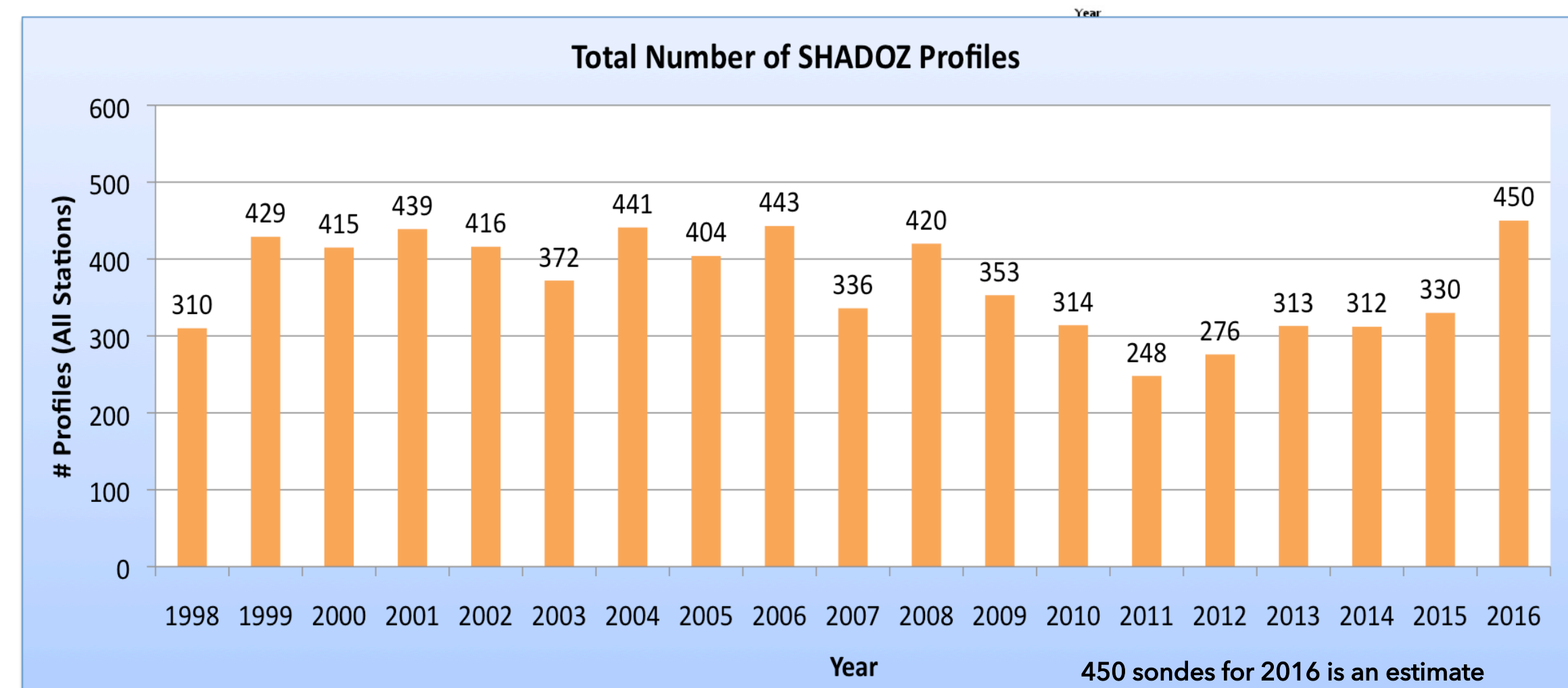
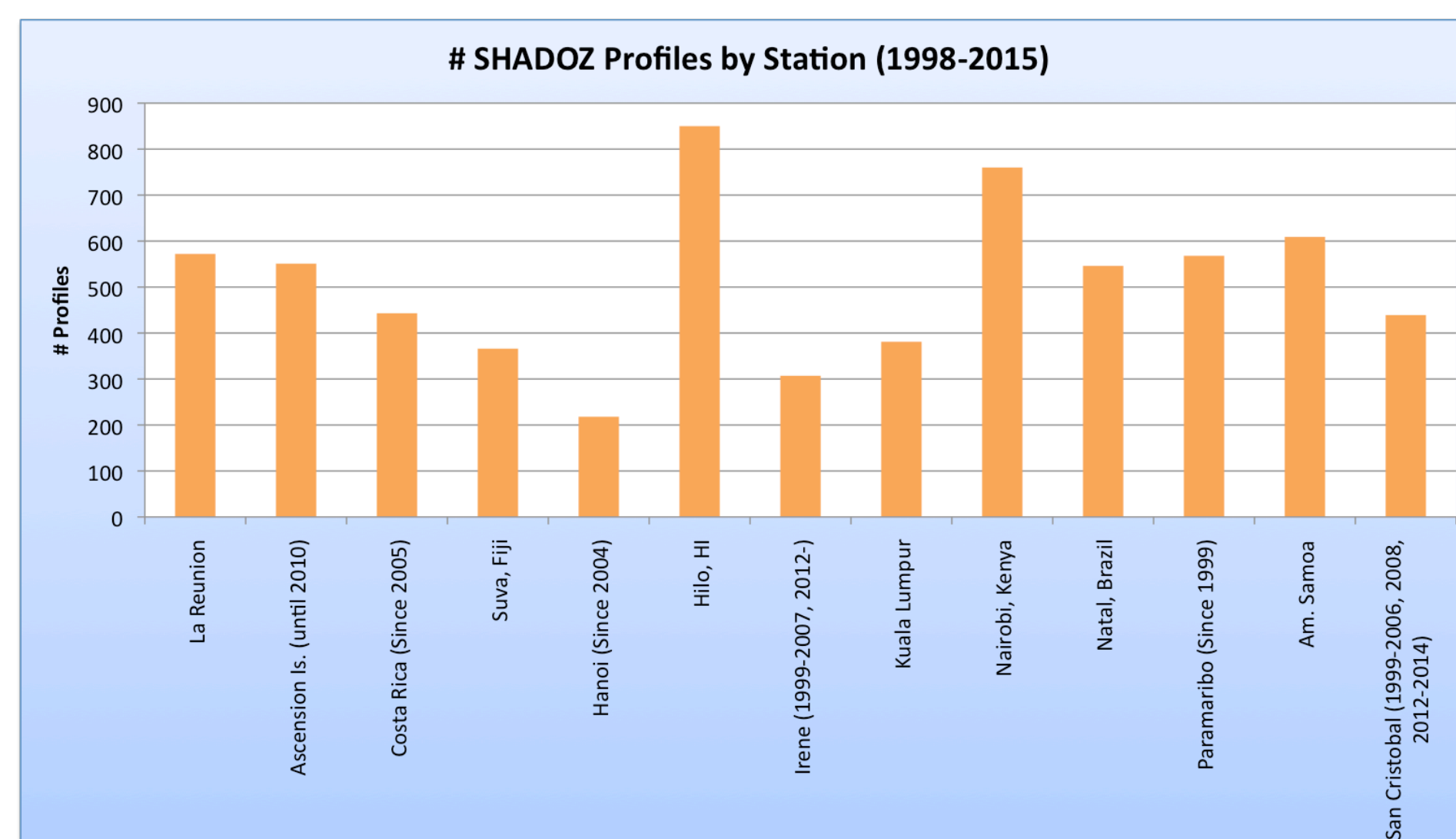
* Colors for stations indicate geographic region: blue-Western Pacific, red-Atlantic/Africa, white-Subtropics, & green-Equatorial Americas
** See Acronyms in Appendix. *** Station formerly referred to as Alajuela / Heredia

AVAILABLE DATA PER SHADOZ STATION (where # Profiles/Year is > 10)																			
Y	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
E	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R	8	9	0	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1

Ascension Is.																			
Costa Rica++																			
Suva Fiji																			
Hanoi, Vietnam																			
Irene, S. Africa																			
Kuala Lumpur, Mal.																			
La Reunion Is., FR																			
Nairobi, Kenya																			
Natal, Brazil																			
Paramaribo, Sur.																			
Am. Samoa																			
San Cristóbal, Ec.																			

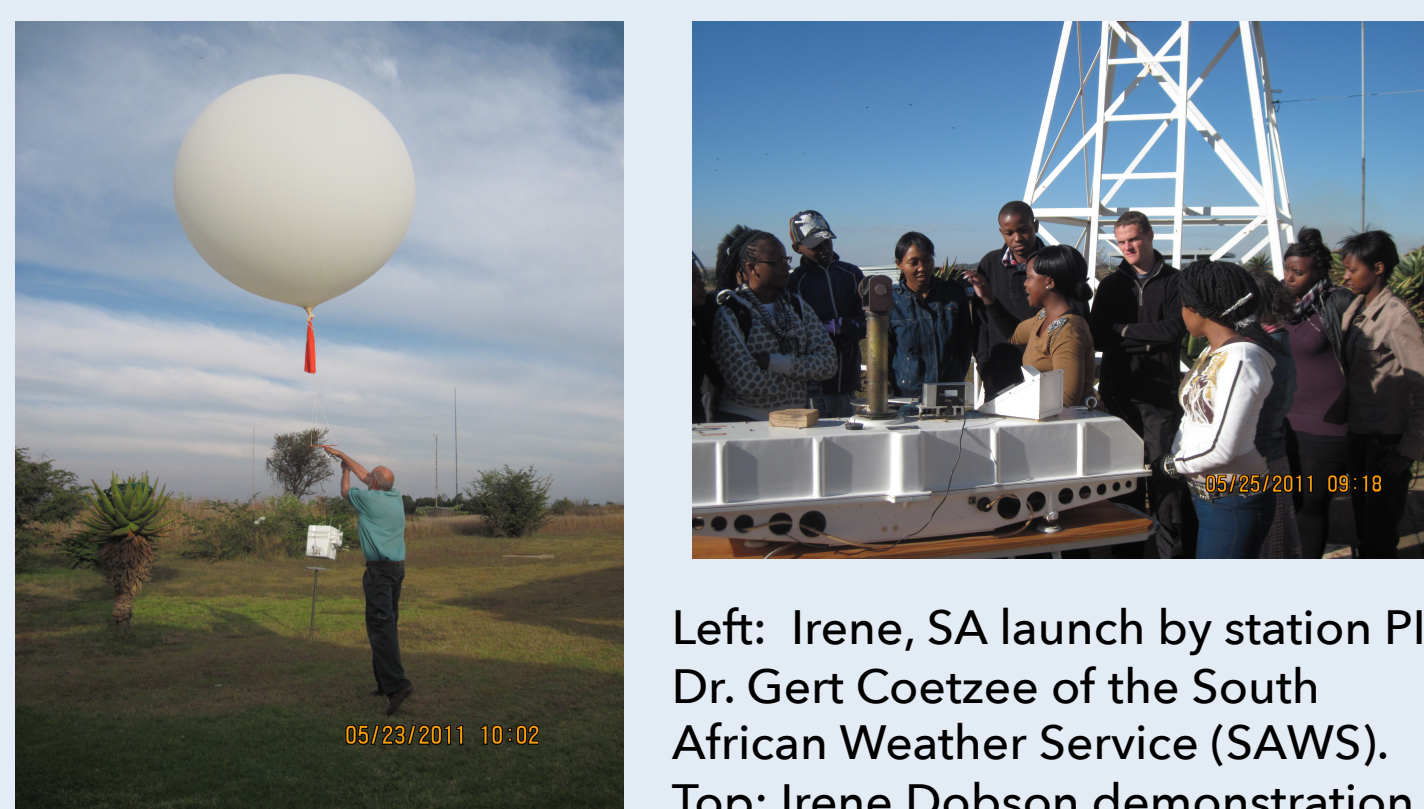


Primary SHADOZ Papers

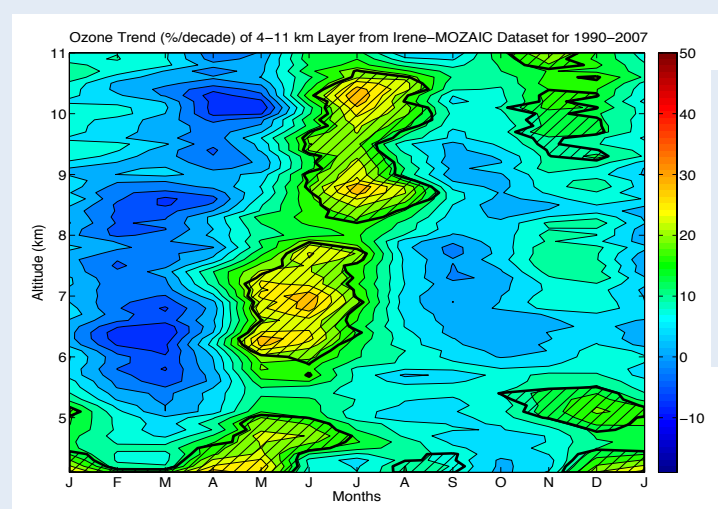


SHADOZ Site Activation

Irene, South Africa



Left: Irene, SA launch by station PI Dr. Gert Coetzee of the South African Weather Service (SAWS).
Top: Irene Dobson demonstration.



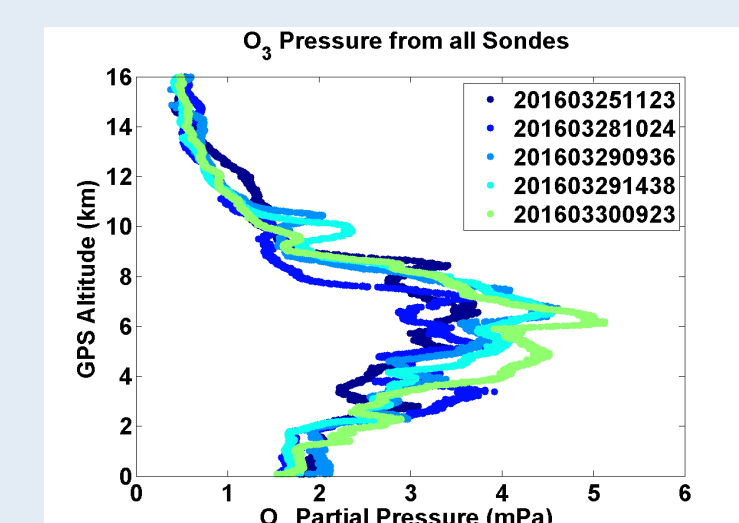
- In 6-11 km layer +(20-30%)/decade O₃ JJA increase! No Sept-Oct fire season trend! Causes: Emissions changes and Long-range Transport.
Results based on Thompson et al., ACP, 9/2014; Balashov et al., JGR, 4/2014.

Suva, Fiji



Dr. Matakite Maata (Univ. South Pacific School of Biological and Chemical Sciences) has been launching ozonesondes since the beginning of the SHADOZ program along with Dr. Francis Mani also of the USP staff. Photos from NOAA (Bryan Johnson) who is SHADOZ Co-I for the Fiji data.

Ascension Island, U.K.



After over 5 years of launch suspensions, Ascension Is. was reactivated March 2016. PI Thompson & Ryan Stauffer (Univ. Md) trained US Air Force contract personnel (left photos of group shot) for the weekly launches with ENSCI/IMet radiosonde/ozonesonde packages.

Complex ozone profiles atypical of this time of year over Ascension Is.

Natal, Brazil



Natal Dobson instrument operating since 1978.

San Cristóbal, Ecuador



(Top) San Cristóbal Is. in the Galapagos is operated by INAMHI (Instituto Nacional de Meteorología e Hidrología) of Ecuador. In May 2012, NOAA visited INAMHI and their new Vaisala Digicora radiosonde system and also to meet with new field personnel on ozonesonde procedures. Right launch is from Group of Prof. Maria Cazorla, Univ. SF-Quito, who works on Ecuador ozone data.

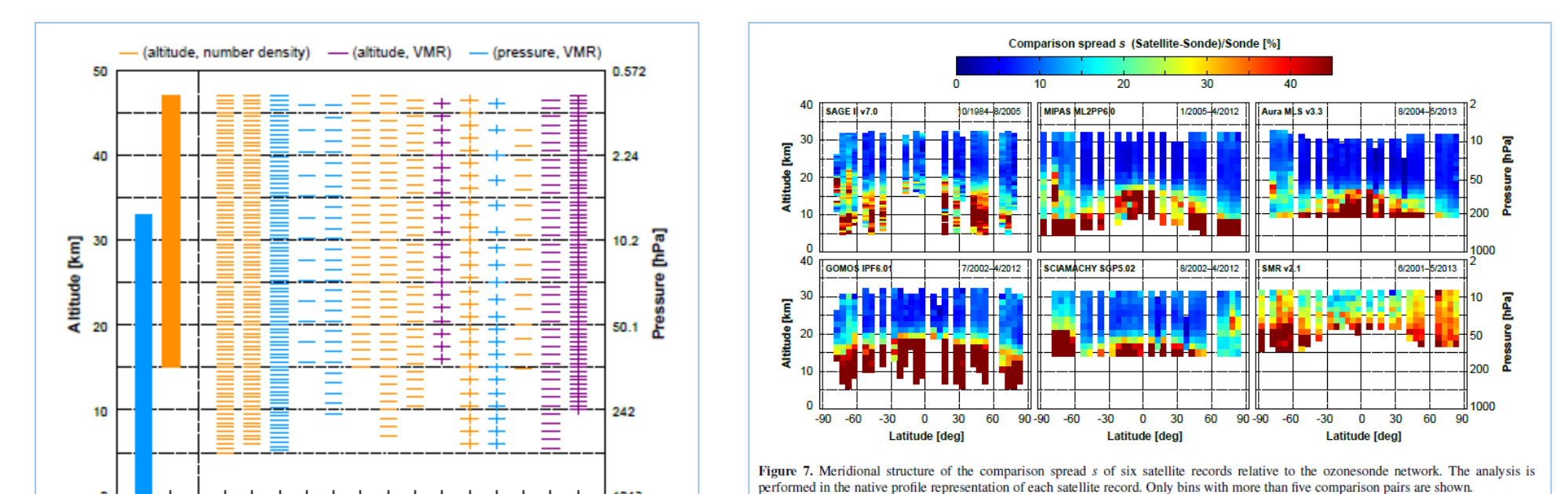
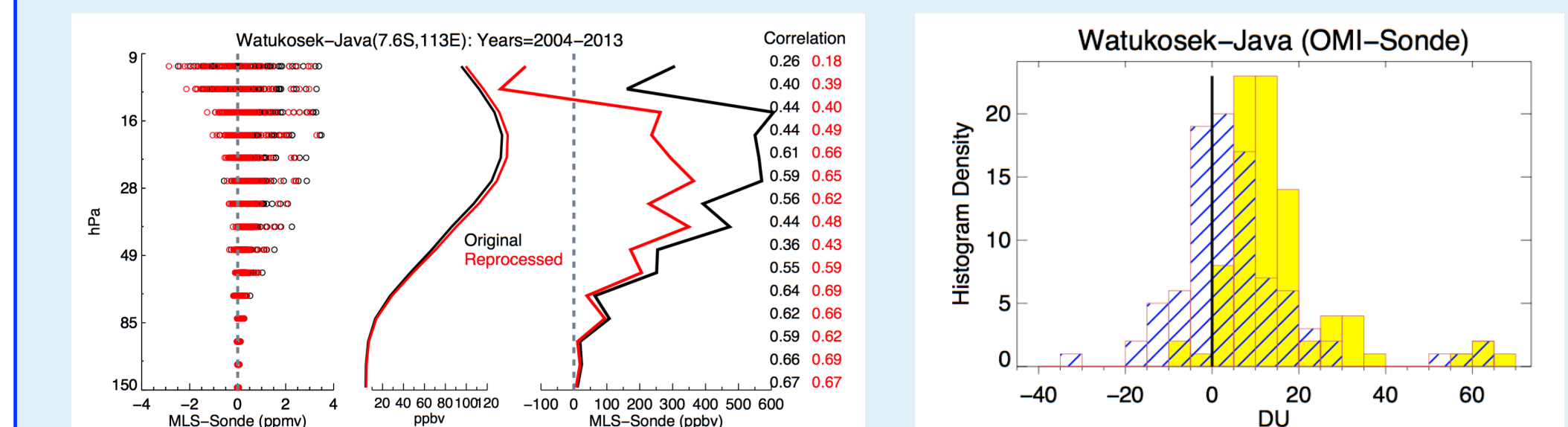
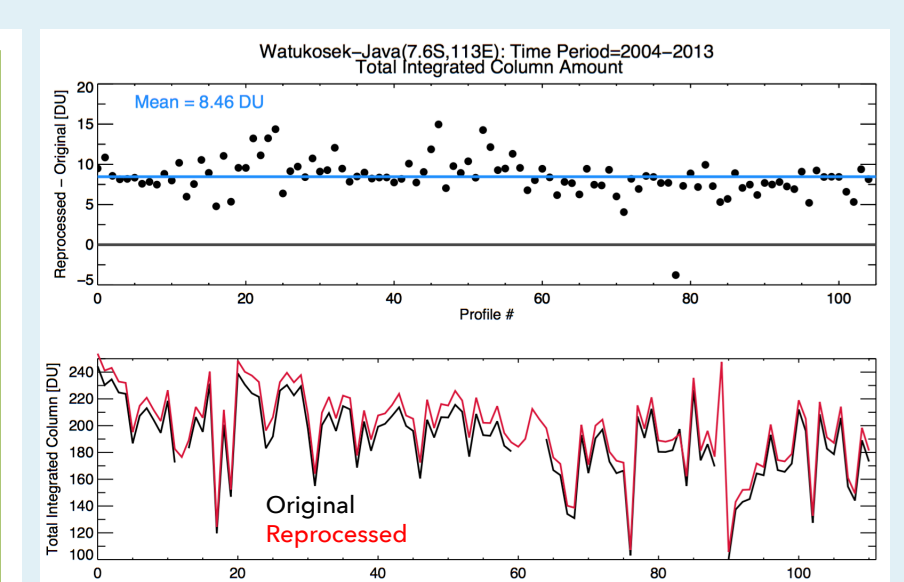


Figure 1. Overview of the native representation of the ozone profile records (see legend). A vertical band defines the approximate range for the ground-based data sets, while individual levels are shown for satellite profiles. Only the levels considered in our analyses are depicted. Profile-dependent vertical grids are marked with small vertical bars. Differences between geometric and geopotential height are neglected.

Hubert et al., ACP, 2016

1st Major Reprocessing: Watukosek-Java, Indonesia

Solution	Type	Correction
	2% No Buffer	Add 2% to the profile: A – B(TCO), A=1.02, B=0.0
Solution Volume	3.0 cc	
Instrument	ENSCI	
Background Current	IB2 used	IB ≤ 0.04 uA, ΔIB=0.02 IB > 0.04 uA, ΔIB=0.04 (NOAA)
PCF	12AVG	22NOAA
Flowrate	Non Applied	Use: T=25°C±5, RH=50%±25, P=1000hPa 1.58%, ΔC _p = 0.003
Pump Temperature	RS80 radiosonde	No GPS – no agreement on pressure bias
Pressure offset	RS80 radiosonde	



- We observe significant increases in reprocessed ozone throughout the profile. i.e. +1.7DU in the troposphere and +6.8DU the stratosphere on average (Upper Right).
- Agreement with MLS (Lower Left) and OMI (Lower Right, blue hatched) is improved significantly with reprocessing.
- Watukosek is the only station our current reprocessing stream that uses NOAA-specific 2% unbuffered KI solution (Upper Left) and therefore follows NOAA reprocessing guidelines.

Acknowledgements: Support for SHADOZ comes from NASA's Aura Validation and Upper Atmosphere Research Programs (UARP; Dr. Kenneth W. Jucks) in partnership with NOAA/Global Monitoring Division and a dozen international partners.